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TIME-SHARED COMPUTER PROGRAMS FOR
OFFICER STRUCTURE POLICY PLANNING

Frank William Reifsnyder, Jr.

United States Naval Postgraduate School



THESIS

Time-Shared Computer Programs
for
Officer Structure Policy Planning

by

Frank William Reifsnyder, Jr.

Thesis Advisor:

Kneale T. Marshall

June 1971

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Time-Shared Computer Programs
for
Officer Structure Policy Planning

by

Frank William Reifsnyder, Jr.
Ensign, United States Navy
B.S., United States Naval Academy, 1970

Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN OPERATIONS RESEARCH

from the

NAVAL POSTGRADUATE SCHOOL
June 1971

ABSTRACT

This thesis develops two personnel flow models which can aid the manpower policy planner to predict future officer structures through the use of a time-shared computer system. The underlying structure is presented for both models. One model considers promotions based on length of commissioned service. The other model considers promotions based on length of time in grade. Computer programs are developed for both models and sample outputs are shown. The programs are used on a time-shared computer system so that the policy planner can interact with the computer with a minimal knowledge of computer programming. The computer output is in a concise, easy to understand form.

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I. INTRODUCTION

This thesis develops two personnel flow models which can aid the manpower policy planner to predict future officer structures through the use of a time-shared computer system. (An important feature of this system is that the policy planner does not need to understand computer operation or computer language to use this capability.) Computer programs are written that model officer promotions two different ways. The programs are written so that the instructions and the computer responses are given in plain, easy-to-understand English. To use these programs, the user simply types in a few numbers in response to questions asked by the computer. The questions that the computer asks are designed to determine the various parameters that influence officer promotions and the officer structure in general. Approximately thirty-five questions are asked for each program. The actual number of questions varies according to the complexity of the model used.

In addition to the answers to the questions asked by the computer, the computer must also know the current state of the officer structure. This is entered into the computer at the same time the programs are loaded.

Both computer programs are written in FORTRAN. This enables their use on almost all digital computing systems. They are designed to be used in a time-shared mode. The computing time for either program is less than two seconds.

Promotion and retirement are the chief methods used by the Navy to control the size and structure of the officer inventory. The size of the inventory depends on many factors and parameters. These factors include the number of new ensigns commissioned each year, the number in each rank promoted each year, and the numbers that resign or retire each year. In addition, there are many limitations imposed by Title Ten of the United States Code and the Secretary of the Navy.

The first program developed is called the Time in Service Manpower Planning Model, and the theory for this program is developed in Section II. This model assumes that promotions are a function of the total length of commissioned service, and not the length of time in grade. In the case of a captain, this might be twenty years. Another assumption is that a fixed percentage (chosen by the policy planner) of officers are promoted to the next highest rank each year. These percentages may vary over the total span of commissioned service, but for any one year they are fixed. Losses to the system are assumed to depend on both rank and length of commissioned service.

The second program developed is called the Time in Grade Manpower Planning Model, and the theory for the program is developed in Section III. This model assumes that promotions are a function of the total time spent in each rank, and not his cumulative length of service. In the case of a captain, he might be promoted after five years as a commander. Losses are assumed to depend on rank and time spent in each rank, and again are chosen by the policy planner.

Section IV shows two sample runs of the programs with complete printouts of input and output. Each consists of only a few pages

of computer printout. This contrasts with the usual planning models which usually give voluminous output which is very difficult to interpret by the user.

II. TIME IN SERVICE MANPOWER PLANNING MODEL

A. INTRODUCTION

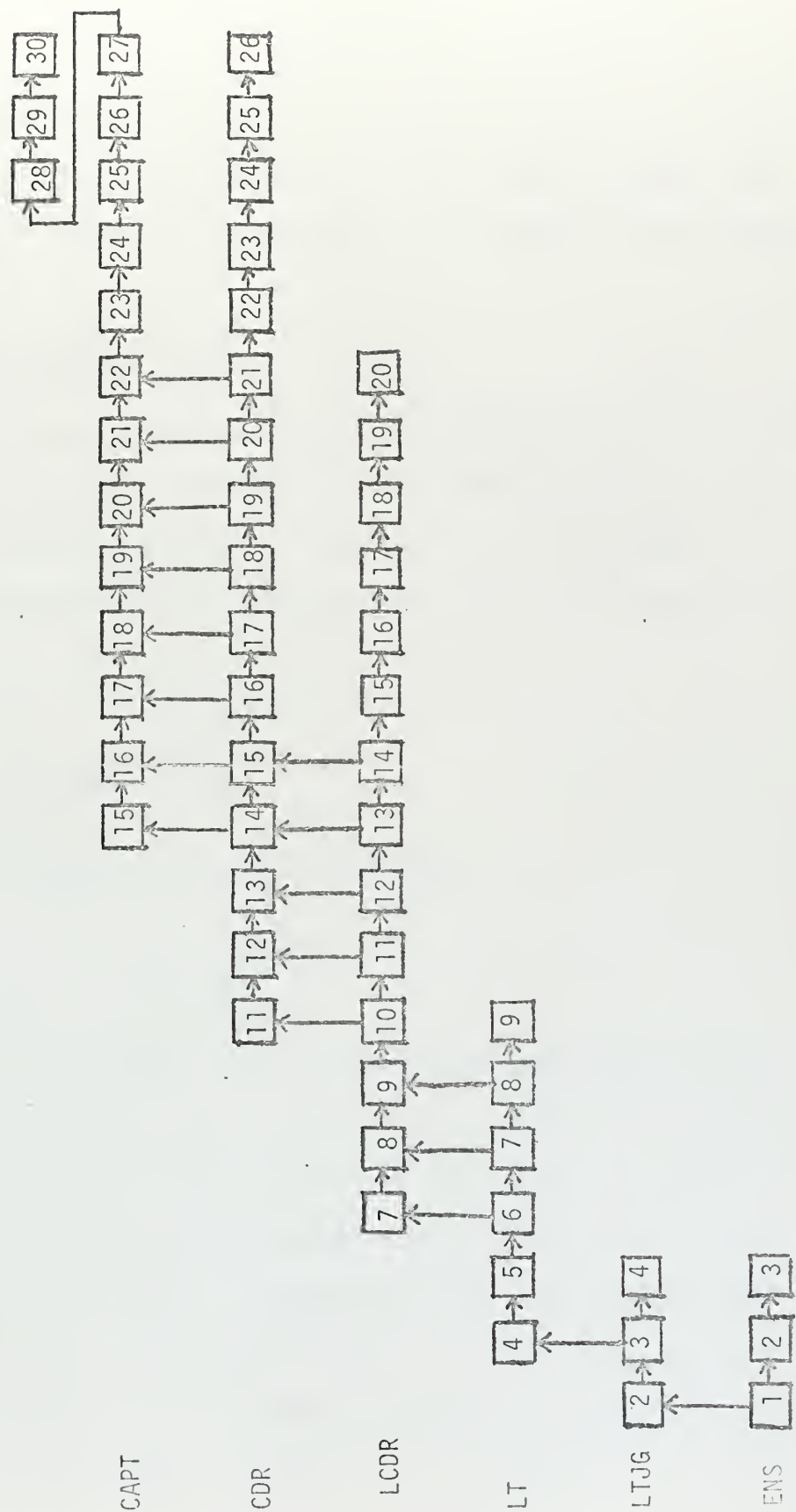
The Time in Service Manpower Planning Model (TIS) models the future flow of officer personnel in the Navy. In this model, promotions are assumed to be a function of the total amount of service after the date at which an individual is commissioned an officer. A typical flow-chart is shown in Figure 1. The data used to construct this flowchart was taken from "The Officer Personnel Newsletter" which is published quarterly by the Bureau of Naval Personnel. In the October, 1970 edition, the following promotion flowpoints were given:

	Due Course	Maximum Acceleration
Flag eligible	24-25 years	18-19 years
Captain	20-21 years	14-15 years
Commander	14 years	10 years
Lieutenant Commander	8 years	6 years
Lieutenant	3 years	3 years

Normal officer promotions occurred at the times labeled "Due Course." Exceptional performers could be promoted at any time from the maximum acceleration points to the normal due course promotion points.

The TIS Manpower Planning Model examines the officer structure in discrete steps. The length of one step is one year. Each year, one of three events can happen. The officer can be promoted, he can remain in the same rank, or he can leave the system. The numbers of officers in each category are based on expected values, hence this model is deterministic rather than probabilistic.

Figure 1. Typical Time in Service Officer Promotion Flowchart.



The TIS Manpower Planning Model considers promotions before losses. That is, each year all promotions are accomplished before any losses are deducted from the system. Losses are a function of both rank and total commissioned service. The basic types of losses and the mathematical structure of the model are discussed in the following section.

B. MATHEMATICAL MODEL

Let $R1(U,K)$ equal the number of ensigns present in year U who were commissioned in year K . Let $P2(J)$ be the proportion of ensigns promoted J years after commissioning. Let $L1(J)$ be the proportion of ensigns not promoted who leave the system J years after commissioning. Then:

$$\begin{aligned}
 R1(U,K) &= 0 && \text{if } U < K, \\
 &= R1(K,K) && \text{if } U = K, \\
 &= \prod_{I=K+1}^U [1 - P2(I-K)][1 - L1(I-K)] R1(K,K) && \text{if } K < U \leq NT1 + K, \\
 &= 0 && \text{if } U > NT1 + K,
 \end{aligned}$$

where $R1(K,K)$ is the initial input of commissioned ensigns each year and $NT1$ is the maximum length of commissioned service for an ensign.

Similarly, let $R2(U,K)$ equal the number of lieutenants (junior grade) present in year U who were commissioned as ensigns in year K . Let $P3(J)$ be the proportion of lieutenants (junior grade) promoted to lieutenant J years after commissioning. Let $L2(J)$ be the proportion of lieutenants (junior grade) not promoted who leave the system J years after commissioning. Then:

$$\begin{aligned}
R2(U,K) &= 0 && \text{if } U \leq K, \\
&= [1-L2(1)] [1-P3(1)] Q2(1) && \text{if } U=K+1, \\
&\quad \text{where } Q2(N) = R2(K+N-1,K) + P2(N) R1(K+N-1,K), \\
&= [1-L2(2)] [1-P3(2)] Q2(2) && \text{if } U=K+2, \\
&\quad \vdots \\
&= [1-L2(NT2)] [1-P3(NT2)] Q2(NT2) && \text{if } U=K+NT2, \\
&= 0 && \text{if } U > K+NT2.
\end{aligned}$$

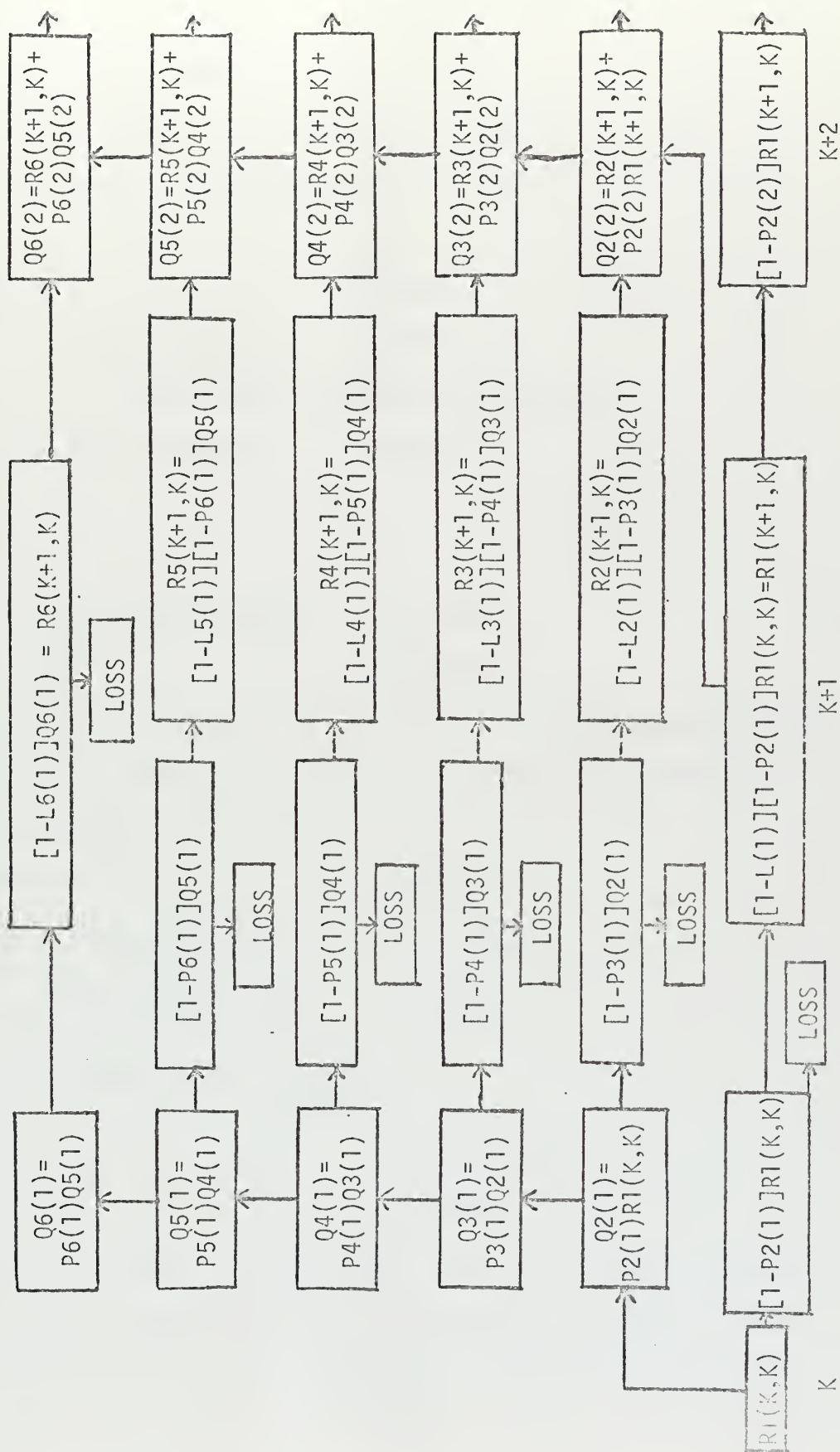
This is the most general case shown in Figure 2. It assumes promotions to lieutenant (junior grade) happen every year, beginning the year after commissioning. It also assumes that promotion to lieutenant can happen every year. This gives the policy planner great flexibility to determine the effects of new policies. Under the current policy, promotion to lieutenant (junior grade) occurs once, after the first year of commissioned service so that the above equation could be drastically simplified into the following expression:

$$\begin{aligned}
R2(U,K) &= 0 && \text{if } U < T_2 + K, \\
&= [P2(T_2) R1(K+T_2-1,K)] \prod_{I=T_2+K}^U [1-P3(I-K)] [1-L2(I-K)] \\
&\quad \text{if } K+T_2 \leq U \leq NT2+K, \\
&= 0 && \text{if } U > NT2+K,
\end{aligned}$$

where T_2 is the length of time for promotion from ensign to lieutenant (junior grade), and $NT2$ is the maximum length of commissioned service for a lieutenant (junior grade).

Equivalent equations are available for both general and special cases for the ranks of lieutenant, lieutenant commander, and commander.

Figure 2. Computing Structure of Time in Service Manpower Planning Model



This model treats the rank of captain as a special case. The time in service model only considers the rank structure from ensign to captain and thus promotion from captain to flag rank is treated as a loss to the system. The general expression for the rank of captain is:

$$\begin{aligned}
 R6(U,K) &= 0 && \text{if } U \leq K, \\
 &= [1-L6(1)]Q6(1) && \text{if } U=K+1, \\
 &\quad \text{where } Q6(N) = R6(K+N-1,K)+P6(N)Q5(N), \\
 &= [1-L6(2)]Q6(2) && \text{if } U=K+2, \\
 &\quad \vdots \\
 &= [1-L6(NT6)]Q6(NT6) && \text{if } U=K+NT6, \\
 &= 0 && \text{if } U > K+NT6.
 \end{aligned}$$

This can be simplified if it is assumed that only two opportunities are available for promotion to captain. The resulting simplified expression would be:

$$\begin{aligned}
 R6(U,K) &= 0 && \text{if } U < K+T_{61}, \\
 &= [1-L6(T_{61})]Q6(T_{61}) && \text{if } U=T_{61}+K, \\
 &= [1-L6(T_{62})]Q6(T_{62}) && \text{if } U=T_{62}+K, \\
 &= [R6(K+T_{62},K)] \prod_{I=T_{62}+K+1}^U (1-L6(I-K)) && \text{if } K+T_{62} < U \leq K+NT6, \\
 &= 0 && \text{if } U > K+NT6,
 \end{aligned}$$

where T_{61} is the length of commissioned service to the first possible promotion point to captain and T_{62} is the length of service to the second possible promotion point to captain. The maximum length of commissioned service for a captain is $NT6$.

Five types of losses to the system are taken into account. First, there is the small fraction of officers that die on active duty or medically retire each year. Second, there is the large fraction that leave after obligated service expires. Third, there are those lieutenants, lieutenant commanders, and commanders who resign their commissions each year before becoming eligible to retire. Fourth, there are those lieutenant commanders, commanders, and captains who retire from active duty. Finally, there are those captains who are promoted to flag rank, which is considered a loss to the system in this model. Loss rates are considered constant over the appropriate applicable time span.

C. COMPUTATIONAL METHODS

Actual computation is a recursive process. Each year is determined from the previous year's total, and a new input is added to the system. Promotions occur before losses are deducted from the system. The basic equations for promotion to lieutenant (junior grade) are:

$$R2(I,K)' = R2(I-1,K) + P2(I-K)R1(I,K) ,$$

$$R1(I,K)' = (1 - P2(I-K))R1(I-1,K).$$

The basic equations for promotion to lieutenant are:

$$R3(I,K)' = R3(I-1,K) + P3(I-K)R2(I,K)',$$

$$R2(I,K)'' = (1 - P3(I-K))R2(I,K)'.$$

The basic equations for promotion to lieutenant commander are:

$$R4(I,K)' = R4(I-1,K) + P4(I-K)R3(I,K)',$$

$$R3(I,K)'' = (1 - P4(I-K))R3(I,K)'.$$

The basic equations for promotion to commander are:

$$R5(I,K)' = R5(I-1,K) + P5(I-K)R4(I,K)',$$

$$R4(I,K)'' = (1 - P5(I-K))R4(I,K)'.$$

The basic equations for promotion to captain are:

$$R6(I,K)' = R6(I-1,K) + P6(I-K)R5(I,K)',$$

$$R5(I,K)'' = (1 - P6(I-K))R5(I,K)'.$$

After promotions are computed, the losses are deducted from the system. The basic equations are:

$$R1(I,K) = (1 - L1(I-K))R1(I,K)'$$

$$RJ(I,K) = (1 - LJ(I-K))RJ(I,K)'' \quad J=2,3,\dots,6.$$

Actual computation by the computer requires slightly modified equations from the ones given above. The computer implicitly keeps track of the current time I and the previous time $I-1$, hence the first subscript on the variable can be dropped. The equations for promotion to lieutenant (junior grade) are:

$$R2(K)' = R2(K) + P2(I-K)R1(K),$$

$$R1(K)' = (1 - P2(I-K))R1(K).$$

Similar modifications are made to the other equations of promotion to the various other ranks. The basic equations for deducting losses are modified as shown below:

$$RJ(K) = (1 - LJ(I-K))RJ(K)', \quad J=1,2,\dots,6.$$

The primes and double primes placed on the left and right hand sides of the equations do not appear in the actual computer program. The computer does not have difficulty distinguishing the term on the left hand side of the equation from the same term used in the right hand side. For example:

$$R1(K) = (1 - L1(I-K))R1(K)$$

is logically correct for the computer. The primes and double primes are added as an aid to understanding the computations.

III. TIME IN GRADE MANPOWER PLANNING MODEL

A. INTRODUCTION

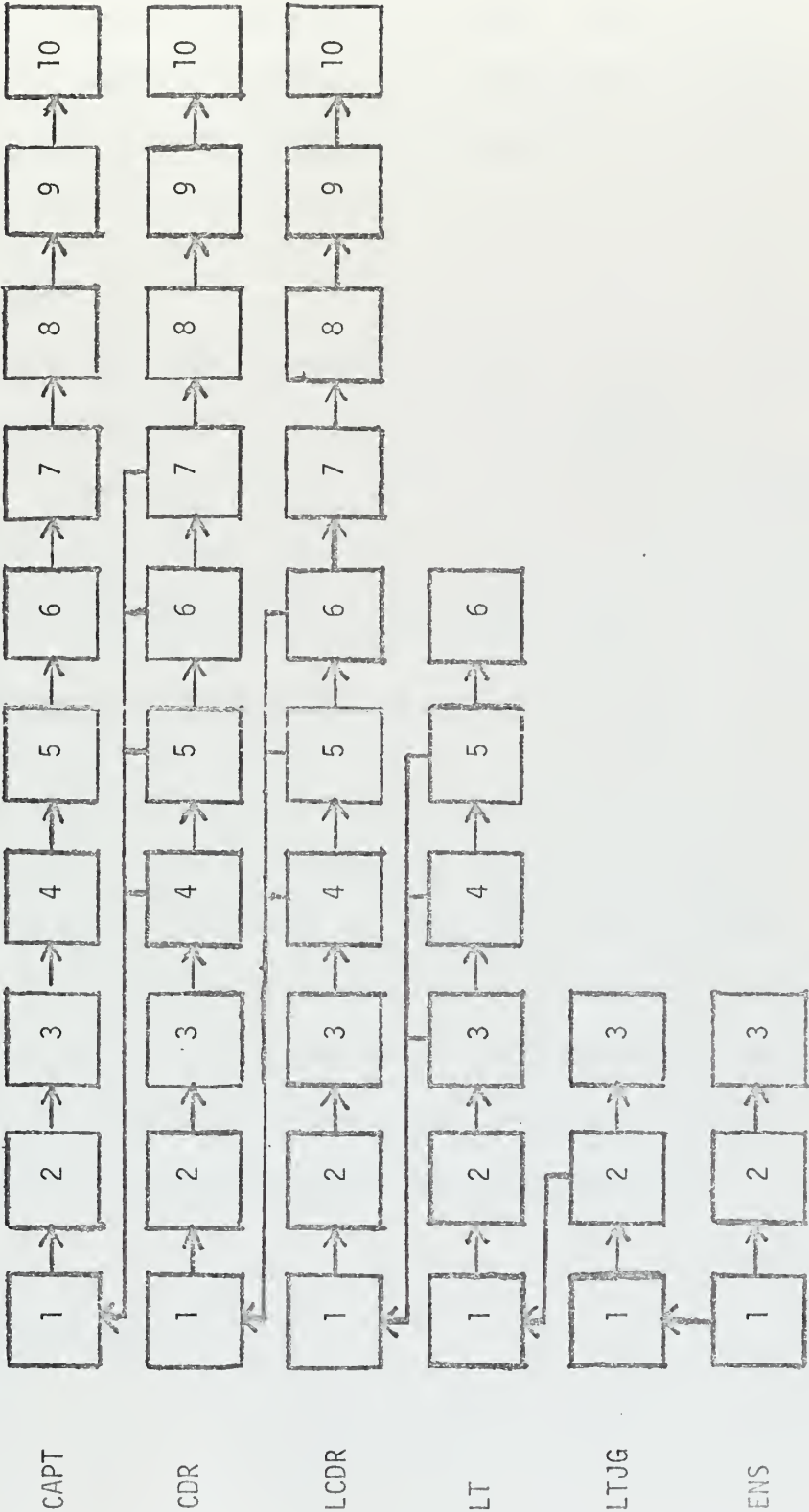
The Time in Grade Manpower Planning Model (TIG) is an alternative way to model the flow of officer personnel in the Navy. In this model, promotions are assumed to be a function of the total amount of time since the last promotion, or since commissioning in the case of ensigns. A typical personnel flowchart using this model is shown in Figure 3. The data used to construct this flowchart was a transformation of the data used in the previous flowchart shown in Figure 1. This transformed data is shown below:

	Due Course	Maximum Acceleration
Flag eligible	4 years	4 years
Captain	6-7 years	4-5 years
Commander	6 years	4 years
Lieutenant Commander	5 years	3 years
Lieutenant	2 years	2 years

Normal officer promotions occur after the time in grade labeled "Due Course." Exceptional performers can be promoted at any time from the maximum acceleration times to the normal due course times.

The TIG Manpower Planning Model also looks at the officer structure in discrete steps. The length of one step is one year. Each year one of three events can happen. First, the officer can remain in the same grade and advance one year of time in that grade. Second, the officer can be promoted into the first year in grade of the next highest rank. Finally, the officer can leave the system. The numbers of officers that qualify for each category are based on expected values, hence this model is deterministic rather than probabilistic.

Figure 3. Typical Time in Grade Officer Promotion Flowchart



As in the previous TIS Model, the TIG Manpower Planning Model considers promotions before losses. Each year all promotions are accomplished before any losses are taken from the system. Losses are a function of both rank and time in grade. The basic types of losses and the mathematical structure of the model are discussed in the following section.

B. MATHEMATICAL MODEL

Let $R1(K,I)$ equal the number of ensigns in their I -th year in the grade of ensign present in year K . Let $P2(I)$ be the proportion of ensigns in their I -th year in that grade who are promoted to lieutenant (junior grade). Let $L1(I)$ be the proportion of ensigns in their I -th year in the grade not promoted who leave the system. Then:

$$R1(K,I) = \prod_{J=1}^{I-1} [1-L1(J)] [1-P2(J)] R1(K-I+1,1) \quad \text{if } I > 1,$$

where $R1(N,1)$ is the initial input into the system for all N .

Similarly, let $R2(K,I)$ equal the number of lieutenants (junior grade) in their I -th year in the grade of lieutenant (junior grade) present in year K . Let $P3(I)$ be the proportion of lieutenants (junior grade) in their I -th year in that grade who are promoted to lieutenant. Let $L2(I)$ be the proportion of lieutenants (junior grade) not promoted in their I -th year in that grade who leave the system.

Then:

$$R2(K,1) = \sum_{J=1}^{NT1} P2(J) R1(K-1,J),$$

$$R2(K,I) = \prod_{J=1}^{I-1} [1-L2(J)] [1-P3(J)] R2(K-I+1,1) \quad \text{if } I > 1,$$

where $NT1$ is the maximum time in grade for an ensign.

Equivalent expressions can be developed for the ranks of lieutenant, lieutenant commander, and commander. For the rank of captain, the basic expressions are modified as in the previous time in service model. Promotion to flag rank is treated as a loss to the system because this model only examines the ranks from ensign to captain. The basic equations for captain are:

$$R6(K,1) = \sum_{J=1}^{NT5} P6(J)R5(K-1,J),$$

$$R6(K,I) = \prod_{J=1}^{I-1} [1-L6(J)]R6(K-I+1,1) \quad \text{if } I>1,$$

where NT5 is the maximum time in grade for commander.

Losses to the system are treated the same way as in the previous time in service model. Five types of losses to the system are taken into account. First, there is the small fraction of officers that die on active duty or medically retire each year. Second, there is the large fraction of officers that leave the system after obligated service expires. Third, there are those lieutenants, lieutenant commanders, and commanders who resign their commissions each year before becoming eligible to retire. Fourth, there are those lieutenant commanders, commanders, and captains who retire each year. Finally, there are those captains who are promoted to flag rank which is considered a loss to the system in this model. Loss rates are considered constant over the appropriate applicable time span.

Losses are deducted from the system after promotions occur. If losses were to occur at the same time as promotions, then the

equations would have to be modified as in the following example for ensigns:

$$R1(K,I) = \prod_{J=1}^{I-1} [1-L1(J)-P2(J)]R1(K-I+1,1)$$

where $L1(J)+P2(J) \leq 1$ for all $J > 1$.

C. COMPUTATIONAL METHODS

The actual computation for the time in grade model is a recursive process. The totals for each year are determined from the previous year's totals, and a new initial input is added to the system. As in the previous model, promotions occur before losses are deducted from the system.

The basic equations for promotion to lieutenant (junior grade) are:

$$R2(K,1)' = \sum_{I=1}^{NT1} P2(I)R1(K-1,I),$$

$$R1(K,I)' = [1-P2(I-1)]R1(K-1,I-1) \quad I=2,\dots,NT1,$$

where $NT1$ is the maximum time in the grade of ensign.

The basic equations for promotion to lieutenant are:

$$R3(K,1)' = \sum_{I=1}^{NT2} P3(I)R2(K-1,I),$$

$$R2(K,I)' = [1-P3(I-1)]R2(K-1,I-1) \quad I=2,\dots,NT2,$$

where $NT2$ is the maximum time in the grade of lieutenant (junior grade).

The basic equations for promotion to lieutenant commander are:

$$R4(K,1)' = \sum_{I=1}^{NT3} P4(I)R3(K-1,I),$$

$$R3(K,I)' = [1-P4(I-1)]R3(K-1,I-1) \quad I=2,\dots,NT3,$$

where $NT3$ is the maximum time in the grade of lieutenant.

The basic equations for promotion to commander are:

$$R5(K,1)' = \sum_{I=1}^{NT4} P5(I)R4(K-1,I),$$

$$R4(K,I)' = [1-P5(I-1)]R4(K-1,I-1) \quad I=2,\dots,NT4,$$

where NT4 is the maximum time in the grade of lieutenant commander.

The basic equations for promotion to captain are:

$$R6(K,1)' = \sum_{I=1}^{NT5} P6(I)R5(K-1,I),$$

$$R5(K,I)' = [1-P6(I-1)]R5(K-1,I-1) \quad I=2,\dots,NT5,$$

$$R6(K,I)' = R6(K-1,I-1) \quad I=2,\dots,NT6,$$

where NT5 and NT6 are the maximum times in the grades of commander and captain respectively.

After promotions occur, losses are subtracted from the system.

The basic equations are:

$$RJ(K,I) = [1-LJ(I)]RJ(K,I)' \quad I=1,\dots,NTJ, \quad J=1,2,\dots,6.$$

The primes on the left and right hand sides of the equations do not appear in the actual computer program. They are added, as in the previous model, to aid in the understanding of the computations.

IV. SAMPLE OUTPUTS

The following pages contain a sample output from the Time in Service Manpower Planning Model and a sample output from the Time in Grade Manpower Planning Model. The outputs were obtained from actual computer runs. The form is the same as that which would appear on the policy planner's computer terminal with one exception. The exception is that the format of the officer structure table in the Time in Grade Manpower Planning Model was altered slightly to fit on the thesis page. The number of officers and the promotion policy examined are examples only and do not necessarily reflect the current officer structure or promotion policy.

For clarity, those items of the program typed in by the policy planner are shown underlined in the following samples. The actual computing time on each one was less than 2 seconds.

EXECUTION BEGINS...

***** TIME IN SERVICE MANPOWER PLANNING MODEL *****

DO YOU DESIRE A PRINTOUT OF THE CURRENT OFFICER STRUCTURE? YES=1. NO=0.
1.

OFFICER STRUCTURE 1971					
SERVICE DATE	ENS	LTJG	LT	LCDR	CDR
1941	0.	0.	0.	0.	0.
1942	0.	0.	0.	0.	0.
1943	0.	0.	0.	0.	0.
1944	0.	0.	1.	0.	0.
1945	0.	0.	0.	0.	13.
1946	0.	0.	0.	1.	87.
1947	0.	0.	0.	0.	309.
1948	0.	0.	0.	0.	525.
1949	0.	0.	0.	68.	598.
1950	0.	0.	1.	70.	779.
1951	0.	0.	0.	174.	046.
1952	0.	0.	0.	117.	344.
1953	0.	0.	1.	174.	369.
1954	0.	0.	0.	324.	572.
1955	0.	0.	0.	467.	652.
1956	0.	0.	0.	778.	157.
1957	0.	0.	4.	783.	58.
1958	0.	0.	23.	1029.	34.
1959	0.	0.	21.	1239.	14.
1960	0.	0.	81.	1162.	4.
1961	0.	1.	856.	977.	7.
1962	0.	0.	1746.	139.	4.
1963	0.	0.	1694.	79.	2.
1964	0.	0.	1936.	36.	1.
1965	0.	3.	1731.	10.	4.
1966	0.	36.	2333.	2.	2.
1967	0.	3434.	466.	4.	0.
1968	0.	5755.	42.	5.	0.

1969	6576.	0.	11.	1.	0.
1970	6422.	0.	5.	0.	0.
TOTAL	12998.	9308.	10842.	7696.	2408.

TYPE THE YEAR YOU DESIRE TO PREDICT. EX. 1985

1331

THE PRESENT NUMBERS OF OFFICERS WITH EACH SERVICE DATE OR ITS EQUIVALENT HAVE BEEN SHOWN ABOVE. THE FUTURE NUMBER OF OFFICERS WITH EACH SERVICE DATE 10 YEARS FROM NOW WILL BE PREDICTED. ANSWER YES/NO QUESTIONS AS DIRECTED. ANSWER WHEN/WHAT FRACTION QUESTIONS WITH A 2 DIGIT INTEGER NEAREST THE TOTAL LENGTH OF COMMISSIONED SERVICE, THEN LEAVE 1 SPACE BLANK AND TYPE THE APPROPRIATE DECIMAL FRACTION. EX. 08 .75 ALL TIMES REFER TO THE TOTAL LENGTH OF COMMISSIONED SERVICE UNLESS OTHERWISE SPECIFIED. WE ARE NOW READY TO BEGIN.

HOW MANY NEW ENS. ARE COMMISSIONED EACH YEAR?

1352.

WHEN AND WHAT FRACTION OF ENS. ARE PROMOTED TO LTJG?

12 1.0

WHEN AND WHAT FRACTION OF LTJG ARE PROMOTED TO LT?

0 0.95

WHEN AND WHAT FRACTION OF LT ARE PROMOTED TO LCDR?

05 0.90

ANY EARLY PROMOTIONS TO LCDR? YES=1. NO=0.

1.

WHEN AND WHAT FRACTION OF LT ARE PROMOTED EARLY TO LCDR?

17 0.05

ANY OTHER EARLY PROMOTIONS TO LCDR? YES=1. NO=0.

0.

ANY LATE PROMOTIONS TO LCDR? YES=1. NO=0.

0.

WHEN AND WHAT FRACTION OF LCDR ARE PROMOTED TO CDR?

10 0.75

ANY EARLY PROMOTIONS TO CDR? YES=1. NO=0.

1.

WHEN AND WHAT FRACTION OF LCDR ARE PROMOTED EARLY TO CDR?

1 0.95

ANY OTHER EARLY PROMOTIONS TO CDR? YES=1. NO=0.

1. ANY LATE PROMOTIONS TO CDR? YES=1. NO=0.

2. WHEN AND WHAT FRACTION OF CDR ARE PROMOTED TO CAPT?

23.44

3. ANY EARLY PROMOTIONS TO CAPT? YES=1. NO=0.

1.

4. WHEN AND WHAT FRACTION OF CDR ARE PROMOTED EARLY TO CAPT?

1.05

5. ANY OTHER EARLY PROMOTIONS TO CAPT? YES=1. NO=0.

1. ANY LATE PROMOTIONS TO CAPT? YES=1. NO=0.

6. WHAT IS THE MAXIMUM LENGTH OF COMMISSIONED SERVICE FOR ENS?

03 FOR LTJG?

04 FOR LT?

12 FOR LCDR?

11 FOR CDR?

11 FOR CAPT?

50

WHEN A CHANGE IN PROMOTION POLICY OCCURS SO THAT THE TIME IN SERVICE FOR ANY PROMOTION IS DECREASED, THE POSSIBILITY ALSO OCCURS THAT SOME YEAR GROUP WILL MISS ITS PRIMARY CHANCE FOR PROMOTION. TO CORRECT FOR THIS ERROR, THIS PROGRAM ALLOWS A FRACTION OF THAT YEAR GROUP TO BE SPOT PROMOTED TO THE NEXT HIGHEST GRADE.

1. DO YOU DESIRE TO SPOT PROMOTE ANY YEAR GROUP OF ENS? YES=1. NO=0.

1. DO YOU DESIRE TO SPOT PROMOTE ANY YEAR GROUP OF LTJG? YES=1. NO=0.

1. THE SERVICE DATE (4 DIGITS) OF THAT YEAR GROUP.

1367 WHAT FRACTION DO YOU DESIRE TO SPOT PROMOTE?
1368 DO YOU DESIRE TO SPOT PROMOTE ANY OTHER YEAR GROUP OF LTJG? YES=1. NO=0.
1369 DO YOU DESIRE TO SPOT PROMOTE ANY YEAR GROUP OF LT? YES=1. NO=0.
1370 TYPE THE SERVICE DATE (4 DIGITS) OF THAT YEAR GROUP.
1371 WHAT FRACTION DO YOU DESIRE TO SPOT PROMOTE?
1372 DO YOU DESIRE TO SPOT PROMOTE ANY OTHER YEAR GROUP OF LT? YES=1. NO=0.
1373 TYPE THE SERVICE DATE (4 DIGITS) OF THAT YEAR GROUP.
1374 WHAT FRACTION DO YOU DESIRE TO SPOT PROMOTE?
1375 DO YOU DESIRE TO SPOT PROMOTE ANY OTHER YEAR GROUP OF LT? YES=1. NO=0.
1376 TYPE THE SERVICE DATE (4 DIGITS) OF THAT YEAR GROUP.
1377 WHAT FRACTION DO YOU DESIRE TO SPOT PROMOTE?
1378 DO YOU DESIRE TO SPOT PROMOTE ANY OTHER YEAR GROUP OF LCDR? YES=1. NO=0.
1379 TYPE THE SERVICE DATE (4 DIGITS) OF THAT YEAR GROUP.
1380 WHAT FRACTION DO YOU DESIRE TO SPOT PROMOTE?
1381 DO YOU DESIRE TO SPOT PROMOTE ANY YEAR GROUP OF CDR? YES=1. NO=0.
1382 TYPE THE SERVICE DATE (4 DIGITS) OF THAT YEAR GROUP.
1383 WHAT FRACTION DO YOU DESIRE TO SPOT PROMOTE?
1384 DO YOU DESIRE TO SPOT PROMOTE ANY OTHER YEAR GROUP OF CDR? YES=1. NO=0.

NOW CONSIDER LOSSES TO THE SYSTEM.

WHAT FRACTION OF OFFICERS DIE OR RETIRE MEDICALLY EACH YEAR?

20

WHAT IS THE LENGTH OF OBLIGATED SERVICE?

21

WHAT FRACTION QUIT AFTER OBLIGATED SERVICE?

22

WHAT FRACTION OF LT RESIGN EACH YEAR?

23

WHAT FRACTION OF LCDR RESIGN EACH YEAR PRIOR TO RETIREMENT?

24

WHAT FRACTION OF EACH YEAR GROUP OF CDR RESIGN EACH YEAR PRIOR TO MANDATORY RETIREMENT?

25

WHAT FRACTION OF EACH YEAR GROUP OF LCDR RETIRE EACH YEAR PRIOR TO MANDATORY RETIREMENT?

26

WHAT FRACTION OF EACH YR GROUP OF CDR RETIRE EACH YEAR PRIOR TO MANDATORY RETIREMENT?

27

WHAT FRACTION OF EACH YR GROUP OF CAPT RETIRE EACH YEAR PRIOR TO MANDATORY RETIREMENT?

28

WHEN AND WHAT FRACTION OF CAPT ARE PROMOTED TO FLAG?

29

SERVICE DATE	ENS	OFFICER STRUCTURE 1981			
		LTJG	LT	LCDR	CDR
1952	0.	0.	0.	0.	60.
1953	0.	0.	0.	0.	61.
1954	0.	0.	0.	0.	93.
1955	0.	0.	0.	0.	102.
1956	0.	0.	0.	0.	116.
1957	0.	0.	0.	0.	117.
1958	0.	0.	0.	0.	145.
1959	0.	0.	0.	0.	166.
1960	0.	0.	0.	0.	150.
1961	0.	0.	0.	0.	151.
1962	0.	0.	0.	102.	24.
1963	0.	0.	0.	104.	0.

1964	0.	0.	0.	0.	89.	360.	0.
1965	0.	0.	0.	0.	93.	357.	0.
1966	0.	0.	0.	0.	123.	444.	0.
1967	0.	0.	0.	0.	106.	362.	0.
1968	0.	0.	0.	0.	707.	40.	0.
1969	0.	0.	0.	0.	939.	1.	0.
1970	0.	0.	0.	0.	1021.	0.	0.
1971	0.	0.	0.	0.	1172.	0.	0.
1972	0.	0.	0.	0.	1332.	0.	0.
1973	0.	0.	0.	0.	1514.	0.	0.
1974	0.	0.	0.	0.	95.	0.	0.
1975	0.	0.	0.	0.	1806.	0.	0.
1976	0.	0.	0.	0.	2160.	0.	0.
1977	0.	0.	0.	0.	2455.	0.	0.
1978	0.	0.	0.	0.	2790.	0.	0.
1979	0.	0.	0.	0.	5812.	0.	0.
1980	6370.	0.	0.	0.	0.	0.	0.
1981	6500.	0.	0.	0.	0.	0.	0.
TOTAL	12870.	6839.	15322.	7405.	3258.	2444.	

EXECUTION BEGINS....

***** TIME IN GRADE MANPOWER PLANNING MODEL *****

DO YOU DESIRE TO SEE THE CURRENT STATE OF THE SYSTEM? YES=1. NO=0.

OFFICER STRUCTURE 1971

RANK	TIME IN GRADE									
	1	2	3	4	5	6	7	8	9	10
ENS	6422.	6576.	0.	0.	0.	0.	0.	0.	0.	0.
LTJG	5755.	3454.	90.	8.	0.	0.	0.	0.	0.	0.
LT	2333.	1761.	1656.	1094.	1746.	856.	81.	21.	23.	4.
LCOR	977.	1162.	1239.	1023.	783.	778.	467.	324.	174.	117.
CDR	652.	572.	369.	344.	646.	779.	598.	525.	309.	87.
CAPT	337.	485.	590.	275.	136.	183.	176.	59.	34.	0.
TOTAL										
TYPE THE YEAR YOU DESIRE TO PREDICT. EX. 1985										

A-01

BY ANSWERING THE FOLLOWING QUESTIONS THE OFFICER STRUCTURE WILL BE PREDICTED FOR 2001. ALL TIMES REFER TO TIME IN GRADE (2 DIGITS) UNLESS OTHERWISE SPECIFIED. WHEN AND WHAT FRACTION QUESTIONS ARE ANSWERED BY TYPING THE TIME IN GRADE (2 DIGITS), LEAVING 1 SPACE BLANK, AND THEN TYPING THE DECIMAL FRACTION. EX. 02 .95

WE ARE NOW READY TO BEGIN.

HOW MANY NEW ENS ARE COMMISSIONED EACH YEAR?

0000.

WHEN AND WHAT FRACTION OF ENS ARE PROMOTED TO LTJG?

0000.

WHEN AND WHAT FRACTION OF LTJG ARE PROMOTED TO LT?

0000.

WHAT IS THE FIRST PROMOTION TO LCOR AND WHAT FRACTION ARE PROMOTED?

0000.

WHAT OTHER PROMOTIONS TO LCOR? YES=1. NO=0.

0000.

WHAT IS THE NEXT PROMOTION TO LCOR AND WHAT FRACTION ARE PROMOTED?

0000.

WHAT OTHER PROMOTIONS TO LCOR? YES=1. NO=0.

0000.

0. WHEN IS THE FIRST PROMOTION TO CDR AND WHAT FRACTION ARE PROMOTED?
 66 .05
 ANY OTHER PROMOTIONS TO CDR? YES=1. NO=0.

1. WHEN IS THE NEXT PROMOTION TO CDR AND WHAT FRACTION ARE PROMOTED?
 67 .75
 ANY OTHER PROMOTIONS TO CDR? YES=1. NO=0.

2. WHEN IS THE FIRST PROMOTION TO CAPT AND WHAT FRACTION ARE PROMOTED?
 68 .05
 ANY OTHER PROMOTIONS TO CAPT? YES=1. NO=0.

3. WHEN IS THE NEXT PROMOTION TO CAPT AND WHAT FRACTION ARE PROMOTED?
 69 .04
 ANY OTHER PROMOTIONS TO CAPT? YES=1. NO=0.

0. WHEN A CHANGE IN PROMOTION POLICY OCCURS SO THAT THE TIME IN GRADE FOR ANY PROMOTION IS DECREASED, THE POSSIBILITY EXISTS THAT SOME GROUP OF OFFICERS WILL MISS THEIR PRIMARY CHANCE FOR PROMOTION. TO CORRECT FOR THIS ERROR, THIS PROGRAM ALLOWS A FRACTION OF THAT GROUP TO BE SPOT PROMOTED TO THE NEXT HIGHEST RANK.
 DO YOU DESIRE TO SPOT PROMOTE ANY GROUP OF ENS? YES=1. NO=0.

1. DO YOU DESIRE TO SPOT PROMOTE ANY GROUP OF LTJG? YES=1. NO=0.

2. DO YOU DESIRE TO SPOT PROMOTE ANY GROUP OF LT? YES=1. NO=0.

3. TYPE THE TIME IN GRADE (2 DIGITS) OF THE GROUP TO BE SPOT PROMOTED.

WHAT FRACTION DO YOU DESIRE TO SPOT PROMOTE?

DO YOU DESIRE TO SPOT PROMOTE ANY OTHER GROUP OF LT? YES=1. NO=0.

DO YOU DESIRE TO SPOT PROMOTE ANY GROUP OF LCDR? YES=1. NO=0.

TYPE THE TIME IN GRADE (2 DIGITS) OF THE GROUP TO BE SPOT PROMOTED.

00

WHAT FRACTION DO YOU DESIRE TO SPOT PROMOTE?

75

DO YOU DESIRE TO SPOT PROMOTE ANY OTHER GROUP OF LCDR? YES=1. NO=0.

0

DO YOU DESIRE TO SPOT PROMOTE ANY GROUP OF CDR? YES=1. NO=0.

0

HOW MANY CONSIDER LOSSES TO THE SYSTEM.

WHAT RANK DOES OBLIGATED SERVICE EXPIRE IN? ENS=1. LTJG=2. LT=3.

3

AFTER WHAT TIME IN THAT RANK DOES OBLIGATED SERVICE EXPIRE?

01

WHAT FRACTION LEAVE AT THE END OF OBLIGATED SERVICE?

00

WHAT FRACTION DIE OR MEDICALLY RETIRE EACH YEAR?

00

WHAT FRACTION OF LT DESIGN EACH YR AFTER OBLIGATED SERVICE?

01

WHAT FRACTION OF LCDR DESIGN EACH YR PRIOR TO RETIREMENT?

00

AFTER WHAT TIME IN GRADE ARE LCDR ELIGIBLE TO RETIRE?

01

WHAT FRACTION OF THOSE LCDR ELIGIBLE RETIRE EACH YR?

00

WHAT FRACTION OF CDR DESIGN EACH YR PRIOR TO RETIREMENT?

00

AFTER WHAT TIME IN GRADE ARE CDR ELIGIBLE TO RETIRE?

00

WHAT FRACTION OF THOSE CDR ELIGIBLE RETIRE EACH YR?

00

WHAT FRACTION OF THOSE CAPT ELIGIBLE RETIRE EACH YR?

00

WHAT FRACTION OF CAPT ARE PROMOTED TO FLAG?

00

WHAT IS THE MAXIMUM TIME IN GRADE FOR ENS?

RANK	OFFICER STRUCTURE 2001										19	TOTAL
	TIME IN GRADE											
	1	2	3	4	5	6	7	8	9	0.		
ENS	5370.	5243.	0.	0.	0.	0.	0.	0.	0.	0.	0.	12613.
LTJG	6113.	5995.	294.	0.	0.	0.	0.	0.	0.	0.	0.	12407.
LT	2734.	2406.	2117.	1770.	155.	0.	0.	0.	0.	0.	0.	9183.
LCDR	1435.	1316.	1158.	1019.	897.	789.	660.	145.	128.	112.	112.	7824.
CUN	478.	414.	364.	320.	282.	195.	80.	58.	43.	31.	31.	2257.
CAPT	90.	81.	73.	56.	53.	47.	43.	38.	34.	31.	31.	556.

APPENDIX A. LIST AND DEFINITIONS OF VARIABLES USED IN THE TIME IN SERVICE MANPOWER PLANNING MODEL

This appendix lists and defines the principal variables used in the Time in Service Manpower Planning Model.

<u>Variable</u>	<u>Definition</u>
TENS(K)	The current number of ENS who were commissioned in year K.
TLTJG(K)	Same as above for LTJG.
TLT(K)	Same as above for LT.
TLCDR(K)	Same as above for LCDR.
TCDR(K)	Same as above for CDR.
TCAPT(K)	Same as above for CAPT.
PLTJG(K)	The fraction of officers promoted to LTJG K years after commissioning.
PLT(K)	Same as above for LT.
PLCDR(K)	Same as above for LCDR.
PCDR(K)	Same as above for CDR.
PCAPT(K)	Same as above for CAPT.
RLOS1(K)	The fraction of officers in the rank of ENS that leave the system K years after commissioning.
RLOS2(K)	Same as above for LTJG.
RLOS3(K)	Same as above for LT.
RLOS4(K)	Same as above for LCDR.
RLOS5(K)	Same as above for CDR.
RLOS6(K)	Same as above for CAPT.
S2(K)	The number of officers spot promoted to LTJG who were commissioned in year K.

S3(K)	Same as above for LT.
S4(K)	Same as above for LCDR.
S5(K)	Same as above for CDR.
S6(K)	Same as above for CAPT.
KHZN	The year to be predicted.
ENS	The number of ensigns commissioned each year in the future.
LE1, L1, LL1	Early, normal, and late promotion points for promotion to LTJG.
LE2, L2, LL2	Same as above for LT.
LE3, L3, LL3	Same as above for LCDR.
LE4, L4, LL4	Same as above for CDR.
LE5, L5, LL5	Same as above for CAPT.
PE1, P1, PL1	Early, normal, and late promotion probabilities for promotion to LTJG.
PE2, P2, PL2	Same as above for LT.
PE3, P3, PL3	Same as above for LCDR.
PE4, P4, PL4	Same as above for CDR.
PE5, P5, PL5	Same as above for CAPT.
NT1, NT2, NT3, NT4, NT5, NT6	Maximum length of commissioned service in each rank.
KG1, F1	Service date and the fraction of officers spot promoted to LTJG.
KG2, F2	Same as above for LT.
KG3, F3	Same as above for LCDR.
KG4, F4	Same as above for CDR.
KG5, F5	Same as above for CAPT.
A	The fraction of officers that die or medically retire each year.

L0S	The length of obligated service.
B	The fraction of officers that leave after obligated service.
C3	The fraction of LT that resign each year.
C4	Same as above for LCDR.
C5	Same as above for CDR.
R1	The fraction of eligible LCDR that retire each year prior to the time of mandatory retirement.
R2	Same as above for CDR.
R3	Same as above for CAPT.
L7, F	The length of commissioned service and the fraction of CAPT promoted to flag rank.
Q1, etc.	The answers to yes/no questions.

APPENDIX B. LIST AND DEFINITIONS OF VARIABLES USED IN THE TIME IN GRADE MANPOWER PLANNING MODEL

This appendix lists and defines the principal variables used in Time in Grade Manpower Planning Model.

<u>Variable</u>	<u>Definition</u>
R1(K,I)	The number of ENS in their I-th year as ENS present in year K.
R2(K,I)	Same as above for LTJG.
R3(K,I)	Same as above for LT.
R4(K,I)	Same as above for LCDR.
R5(K,I)	Same as above for CDR.
R6(K,I)	Same as above for CAPT.
P2(I)	The fraction of officers promoted to LTJG in their I-th year in their present grade.
P3(I)	Same as above for LT.
P4(I)	Same as above for LCDR.
P5(I)	Same as above for CDR.
P6(I)	Same as above for CAPT.
RLOS1(I)	The fraction of ENS in their I-th year as ENS that leave the system.
RLOS2(I)	Same as above for LTJG.
RLOS3(I)	Same as above for LT.
RLOS4(I)	Same as above for LCDR.
RLOS5(I)	Same as above for CDR.
RLOS6(I)	Same as above for CAPT.
S2(I)	The number of ENS in their I-th year as ENS spot promoted to the next rank.

S3(I)	Same as above for LTJG.
S4(I)	Same as above for LT.
S5(I)	Same as above for LCDR.
S6(I)	Same as above for CDR.
NP	The year to be predicted.
ENS	The number of new ensigns commissioned each year in the future.
K2, PLTJG	The promotion point and fraction for promotion to LTJG.
K3, PLT	Same as above for LT.
K4, PLCDR	Same as above for LCDR.
K5, PCDR	Same as above for CDR.
K6, PCAPT	Same as above for CAPT.
J1, F1	The time in grade and fraction of ENS being spot promoted.
J2, F2	Same as above for LTJG.
J3, F3	Same as above for LT.
J4, F4	Same as above for LCDR.
J5, F5	Same as above for CDR.
ROS	The rank in which obligated service expires.
LOS	The length of obligated service.
A	The fraction of officer that die or medically retire each year.
B	The fraction of officers that resign after obligated service expires.
C1	The fraction of LT that resign each year.
C2	Same as above for LCDR.
C3	Same as above for CDR.

KR1	The minimum length of time in grade for retirement as a LCDR.
KR2	Same as above for CDR.
D1	The fraction of LCDR that retire each year prior to mandatory retirement.
D2	Same as above for CDR.
D3	Same as above for CAPT.
KF, FLAG	The length of time in grade and fraction of CAPT promoted to flag rank.
NT1, NT2, NT3, NT4, NT5, NT6	Maximum times is grade for each rank.
Q1, etc.	The answers to yes/no questions.

28 FORMAT (1X, 'ANY OTHER EARLY PROMOTIONS TO CDR? YES=1, NO=0.')

29 FORMAT (1X, 'ANY LATE PROMOTIONS TO CDR? YES=1, NO=0.')

30 FORMAT (1X, 'WHEN AND WHAT FRACTION OF LCDR ARE PROMOTED LATE TO CD
12?')

31 FORMAT (1X, 'ANY OTHER LATE PROMOTIONS TO CDR? YES=1, NO=0.')

32 FORMAT (1X, 'WHEN AND WHAT FRACTION OF CDR ARE PROMOTED TO CAPT?')

33 FORMAT (1X, 'ANY EARLY PROMOTIONS TO CAPT? YES=1, NO=0.')

34 FORMAT (1X, 'WHEN AND WHAT FRACTION OF CDR ARE PROMOTED EARLY TO CA
12?')

35 FORMAT (1X, 'ANY OTHER EARLY PROMOTIONS TO CAPT? YES=1, NO=0.')

36 FORMAT (1X, 'ANY LATE PROMOTIONS TO CAPT? YES=1, NO=0.')

37 FORMAT (1X, 'WHEN AND WHAT FRACTION OF CDR ARE PROMOTED LATE TO CAP
12?')

38 FORMAT (1X, 'ANY OTHER LATE PROMOTIONS TO CAPT? YES=1, NO=0.')

39 FORMAT (1X, 'WHAT IS THE MAXIMUM LENGTH OF COMMISSIONED SERVICE FO
12 ENS?')

40 FORMAT (12) 'FOR LTJG?')

41 FORMAT (1X, 'FOR LTJG?')

42 FORMAT (1X, 'FOR LTJG?')

43 FORMAT (1X, 'FOR LTJG?')

44 FORMAT (1X, 'FOR CAPT?')

45 FORMAT (1X, 'FOR CAPT?')

46 FORMAT (1X, 'NOW CONSIDER LOSSES TO THE SYSTEM.')

47 FORMAT (1X, 'WHAT FRACTION OF OFFICERS DIE OR RETIRE MEDICALLY EACH
1 YEAR?')

48 FORMAT (F5.3)

49 FORMAT (1X, 'WHAT IS THE LENGTH OF OBLIGATED SERVICE?')

50 FORMAT (1X, 'WHAT FRACTION OF LT RESIGN EACH YEAR?')

51 FORMAT (1X, 'WHAT FRACTION OF LCDR RESIGN EACH YEAR PRIOR TO RETIRE
MENT?')

52 FORMAT (1X, 'WHAT FRACTION OF EACH YEAR GROUP OF LCDR RETIRE EACH Y
EAR PRIOR TO MANDATORY RETIREMENT?')

53 FORMAT (1X, 'WHAT FRACTION OF EACH YR GROUP OF CDR RETIRE EACH YEAR
PRIOR TO MANDATORY RETIREMENT?')

54 FORMAT (1X, 'WHAT FRACTION OF EACH YR GROUP OF CAPT RETIRE EACH YEA
PRIOR TO MANDATORY RETIREMENT?')

55 FORMAT (1X, 'WHAT FRACTION OF EACH YR GROUP OF CAPT RETIRE EACH YEA
PRIOR TO MANDATORY RETIREMENT?')

56 FORMAT (1X, 'WHAT FRACTION OF CAPT ARE PROMOTED TO FLAG?')

57 FORMAT (1X, 'WHAT FRACTION OF CAPT YOU DESIRE TO PREDICT. EX. 1985, /')

58 FORMAT (14)

59 FORMAT (1X, 'TIME IN SERVICE MANPOWER PLANNING MD
12?')

60 FORMAT (1X, 'WHAT FRACTION OF EACH YEAR GROUP OF CDR RESIGN EACH YE
AR PRIOR TO MANDATORY RETIREMENT?')

61 FORMAT (1X, 'WHAT FRACTION OF EACH YEAR GROUP OF CDR RESIGN EACH YE
AR PRIOR TO MANDATORY RETIREMENT?')

62 FORMAT (1X, 'WHAT FRACTION OF EACH YEAR GROUP OF CDR RESIGN EACH YE
AR PRIOR TO MANDATORY RETIREMENT?')

63 FORMAT (1X, 'WHAT FRACTION OF EACH YEAR GROUP OF CDR RESIGN EACH YE
AR PRIOR TO MANDATORY RETIREMENT?')

64 FORMAT (1X, 'WHAT FRACTION OF EACH YEAR GROUP OF CDR RESIGN EACH YE
AR PRIOR TO MANDATORY RETIREMENT?')

65 FORMAT (1X, 'WHAT FRACTION OF EACH YEAR GROUP OF CDR RESIGN EACH YE
AR PRIOR TO MANDATORY RETIREMENT?')

66 FORMAT (1X, 'WHAT FRACTION OF EACH YEAR GROUP OF CDR RESIGN EACH YE
AR PRIOR TO MANDATORY RETIREMENT?')

67 FORMAT (1X, 'WHAT FRACTION OF EACH YEAR GROUP OF CDR RESIGN EACH YE
AR PRIOR TO MANDATORY RETIREMENT?')

68 FORMAT (1X, 'WHAT FRACTION OF EACH YEAR GROUP OF CDR RESIGN EACH YE
AR PRIOR TO MANDATORY RETIREMENT?')

69 FORMAT (1X, 'WHAT FRACTION OF EACH YEAR GROUP OF CDR RESIGN EACH YE
AR PRIOR TO MANDATORY RETIREMENT?')

70 FORMAT (1X, 'WHAT FRACTION OF EACH YEAR GROUP OF CDR RESIGN EACH YE
AR PRIOR TO MANDATORY RETIREMENT?')

71 FORMAT (1X, 'WHAT FRACTION OF EACH YEAR GROUP OF CDR RESIGN EACH YE
AR PRIOR TO MANDATORY RETIREMENT?')

72 FORMAT (1X, 'WHAT FRACTION OF EACH YEAR GROUP OF CDR RESIGN EACH YE
AR PRIOR TO MANDATORY RETIREMENT?')

73 FORMAT (1X, 'WHAT FRACTION OF EACH YEAR GROUP OF CDR RESIGN EACH YE
AR PRIOR TO MANDATORY RETIREMENT?')

74 FORMAT (1X, 'WHAT FRACTION OF EACH YEAR GROUP OF CDR RESIGN EACH YE
AR PRIOR TO MANDATORY RETIREMENT?')

75 FORMAT (1X, 'WHAT FRACTION OF EACH YEAR GROUP OF CDR RESIGN EACH YE
AR PRIOR TO MANDATORY RETIREMENT?')

76 FORMAT (1X, 'WHAT FRACTION OF EACH YEAR GROUP OF CDR RESIGN EACH YE
AR PRIOR TO MANDATORY RETIREMENT?')

77 FORMAT (1X, 'WHAT FRACTION OF EACH YEAR GROUP OF CDR RESIGN EACH YE
AR PRIOR TO MANDATORY RETIREMENT?')

78 FORMAT (1X, 'WHAT FRACTION OF EACH YEAR GROUP OF CDR RESIGN EACH YE
AR PRIOR TO MANDATORY RETIREMENT?')

79 FORMAT (1X, 'WHAT FRACTION OF EACH YEAR GROUP OF CDR RESIGN EACH YE
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80 FORMAT (1X, 'WHAT FRACTION OF EACH YEAR GROUP OF CDR RESIGN EACH YE
AR PRIOR TO MANDATORY RETIREMENT?')

81 FORMAT (1X, 'WHAT FRACTION OF EACH YEAR GROUP OF CDR RESIGN EACH YE
AR PRIOR TO MANDATORY RETIREMENT?')

82 FORMAT (1X, 'WHAT FRACTION OF EACH YEAR GROUP OF CDR RESIGN EACH YE
AR PRIOR TO MANDATORY RETIREMENT?')

83 FORMAT (1X, 'WHAT FRACTION OF EACH YEAR GROUP OF CDR RESIGN EACH YE
AR PRIOR TO MANDATORY RETIREMENT?')

84 FORMAT (1X, 'WHAT FRACTION OF EACH YEAR GROUP OF CDR RESIGN EACH YE
AR PRIOR TO MANDATORY RETIREMENT?')

85 FORMAT (1X, 'WHAT FRACTION OF EACH YEAR GROUP OF CDR RESIGN EACH YE
AR PRIOR TO MANDATORY RETIREMENT?')

86 FORMAT (1X, 'WHAT FRACTION OF EACH YEAR GROUP OF CDR RESIGN EACH YE
AR PRIOR TO MANDATORY RETIREMENT?')

87 FORMAT (1X, 'WHAT FRACTION OF EACH YEAR GROUP OF CDR RESIGN EACH YE
AR PRIOR TO MANDATORY RETIREMENT?')

88 FORMAT (1X, 'WHAT FRACTION OF EACH YEAR GROUP OF CDR RESIGN EACH YE
AR PRIOR TO MANDATORY RETIREMENT?')

89 FORMAT (1X, 'WHAT FRACTION OF EACH YEAR GROUP OF CDR RESIGN EACH YE
AR PRIOR TO MANDATORY RETIREMENT?')

90 FORMAT (1X, 'WHAT FRACTION OF EACH YEAR GROUP OF CDR RESIGN EACH YE
AR PRIOR TO MANDATORY RETIREMENT?')

91 FORMAT (1X, 'WHAT FRACTION OF EACH YEAR GROUP OF CDR RESIGN EACH YE
AR PRIOR TO MANDATORY RETIREMENT?')

92 FORMAT (1X, 'WHAT FRACTION OF EACH YEAR GROUP OF CDR RESIGN EACH YE
AR PRIOR TO MANDATORY RETIREMENT?')

93 FORMAT (1X, 'WHAT FRACTION OF EACH YEAR GROUP OF CDR RESIGN EACH YE
AR PRIOR TO MANDATORY RETIREMENT?')

94 FORMAT (1X, 'WHAT FRACTION OF EACH YEAR GROUP OF CDR RESIGN EACH YE
AR PRIOR TO MANDATORY RETIREMENT?')

95 FORMAT (1X, 'WHAT FRACTION OF EACH YEAR GROUP OF CDR RESIGN EACH YE
AR PRIOR TO MANDATORY RETIREMENT?')

96 FORMAT (1X, 'WHAT FRACTION OF EACH YEAR GROUP OF CDR RESIGN EACH YE
AR PRIOR TO MANDATORY RETIREMENT?')

97 FORMAT (1X, 'WHAT FRACTION OF EACH YEAR GROUP OF CDR RESIGN EACH YE
AR PRIOR TO MANDATORY RETIREMENT?')

98 FORMAT (1X, 'WHAT FRACTION OF EACH YEAR GROUP OF CDR RESIGN EACH YE
AR PRIOR TO MANDATORY RETIREMENT?')

99 FORMAT (1X, 'WHAT FRACTION OF EACH YEAR GROUP OF CDR RESIGN EACH YE
AR PRIOR TO MANDATORY RETIREMENT?')

100 FORMAT (1X, 'WHAT FRACTION OF EACH YEAR GROUP OF CDR RESIGN EACH YE
AR PRIOR TO MANDATORY RETIREMENT?')


```

WRITE (6,9)
RTAD (5,19) Q13 GO TO 57
IF (Q13.EQ.1.) GO TO 57
KYEART=1971
KSTART=KYEART-31
WRITE (6,3000) KYEART
DO 3 K=1,31
KK=K+KSTART
WRITE (6,3100) KK,TEMS(K),TLTJG(K),TLCDR(K),TCDR(K),TCAPT(K)
3 CONTINUE
SENSE=0.
SLTJG=0.
SLCDR=0.
SCDR=0.
SCAPT=0.
DO 41 K=1,30
SENS=SENS+TEMS(K)
SLTJG=SLTJG+TLTJG(K)
SLT=SLT+TLT(K)
SCDR=SCDR+TCDR(K)
SCAPT=SCAPT+TCAPT(K)
41 CONTINUE
61 WRITE (6,312) SLNS,SLTJG,SLT,SLCDR,SCDR,SCAPT
57 WRITE (6,58) KH7N
59 KH=KH2L-KSTART
DO 7 K=1,30
PLTJG(K)=0.
PLT(K)=0.
PLCDR(K)=0.
PCDR(K)=0.
PCAPT(K)=0.
7 CONTINUE
DO 8 K=31,KH
TEMS(K)=0.
TLTJG(K)=0.
TLT(K)=0.
TLCDR(K)=0.
TCDR(K)=0.
TCAPT(K)=0.
8 CONTINUE
DO 119 K=1,30
SP(K)=0.
SA(K)=0.
SA(K)=0.
SA(K)=0.

```



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119 S6(K)=0
      CONTINUE
      KFT=K*HZN-K*YFAR
      WRITE (6,10) KFT
      WRITE (6,11)
      WRITE (6,12)
      PCAD (5,13)=NS
      DO 5 K=31,KH
      TENS(K)=0
      5 CONTINUE
      WRITE (6,14)
      READ (5,15) L1,P1
      PLTJG (L1)=P1
      WRITE (6,16)
      READ (5,15) L2,P2
      PLT(L2)=P2
      WRITE (6,17)
      READ (5,15) L3,P3
      PCOR(L3)=P3
      WRITE (6,18)
      READ (5,19) P1 GO TO 101
      IF (P1.EQ.0) GO TO 101
      102 WRITE (6,20)
      READ (5,15) L3,PE3
      PCOR(L3)=PE3
      WRITE (6,21)
      READ (5,19) P2 GO TO 102
      IF (P2.EQ.0) GO TO 102
      103 WRITE (6,22)
      READ (5,19) P3 GO TO 103
      IF (P3.EQ.0) GO TO 103
      104 WRITE (6,23)
      READ (5,15) L3,PL3
      PCOR(L3)=PL3
      WRITE (6,24)
      READ (5,19) P4 GO TO 104
      IF (P4.EQ.0) GO TO 104
      105 WRITE (6,25)
      PCOR(L4)=P4
      WRITE (6,26)
      READ (5,19) P5 GO TO 105
      IF (P5.EQ.0) GO TO 105
      106 WRITE (6,27)
      READ (5,15) L4,PE4
      PCOR(L4)=PE4
      WRITE (6,28)
      READ (5,19) P6

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105 IF (C6.EQ.1.) GO TO 106
    WRITE (5,29) Q7
106 READ (5,19) Q7
    IF (Q7.EQ.0.) GO TO 107
    WRITE (6,30) LL4,PL4
    PCODE(LL4)=PL4
    WRITE (6,31) Q3
107 READ (5,19) Q3
    IF (Q8.EQ.1.) GO TO 108
    WRITE (6,32) L5,P5
    PCAPI(L5)=P5
    WRITE (6,33) Q9
108 READ (5,19) Q9
    IF (Q9.EQ.0.) GO TO 109
    WRITE (6,34) L5,P5
    PCAPI(L5)=P5
    WRITE (6,35) Q1
109 READ (5,19) Q1
    IF (Q1.EQ.1.) GO TO 110
    WRITE (6,36) Q11
110 READ (5,19) Q11
    IF (Q11.EQ.0.) GO TO 111
    WRITE (6,37) L15,PL5
    PCAPI(L15)=PL5
    WRITE (6,38) Q12
111 READ (5,19) Q12
    IF (Q12.EQ.1.) GO TO 112
    WRITE (6,39) NT1
112 READ (5,40) NT1
    WRITE (6,41) NT2
    WRITE (6,42) NT3
    READ (5,43) NT4
    WRITE (6,44) NT4
    WRITE (6,45) NT5
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    READ (5,605) NT414
    WRITE (6,605) NT414
    WRITE (6,606) NT415
    READ (5,607) NT416
    WRITE (6,607) NT416
    WRITE (6,608) NT417
    READ (5,609) NT418
    WRITE (6,609) NT418
    WRITE (6,610) NT419
    READ (5,611) NT420
    WRITE (6,611) NT420
    WRITE (6,612) NT421
    READ (5,613) NT422
    WRITE (6,613) NT422
    WRITE (6,614) NT423
    READ (5,615) NT424
    WRITE (6,615) NT424
    WRITE (6,616) NT425
    READ (5,617) NT426
    WRITE (6,617) NT426
    WRITE (6,618) NT427
    READ (5,619) NT428
    WRITE (6,619) NT428
    WRITE (6,620) NT429
    READ (5,621) NT430
    WRITE (6,621) NT430
    WRITE (6,622) NT431
    READ (5,623) NT432
    WRITE (6,623) NT432
    WRITE (6,624) NT433
    READ (5,625) NT434
    WRITE (6,625) NT434
    WRITE (6,626) NT435
    READ (5,627) NT436
    WRITE (6,627) NT436
    WRITE (6,628) NT437
    READ (5,629) NT438
    WRITE (6,629) NT438
    WRITE (6,630) NT439
    READ (5,631) NT440
    WRITE (6,631) NT440
    WRITE (6,632) NT441
    READ (5,633) NT442
    WRITE (6,633) NT442
    WRITE (6,634) NT443
    READ (5,635) NT444
    WRITE (6,635) NT444
    WRITE (6,636) NT445
    READ (5,637) NT446
    WRITE (6,637) NT446
    WRITE (6,638) NT447
    READ (5,639) NT448
    WRITE (6,639) NT448
    WRITE (6,640) NT449
    READ (5,641) NT450
    WRITE (6,641) NT450
    WRITE (6,642) NT451
    READ (5,643) NT452
    WRITE (6,643) NT452
    WRITE (6,644) NT453
    READ (5,645) NT454
    WRITE (6,645) NT454
    WRITE (6,646) NT455
    READ (5,647) NT456
    WRITE (6,647) NT456
    WRITE (6,648) NT457
    READ (5,649) NT458
    WRITE (6,649) NT458
    WRITE (6,650) NT459
    READ (5,651) NT460
    WRITE (6,651) NT460
    WRITE (6,652) NT461
    READ (5,653) NT462
    WRITE (6,653) NT462
    WRITE (6,654) NT463
    READ (5,655) NT464
    WRITE (6,655) NT464
    WRITE (6,656) NT465
    READ (5,657) NT466
    WRITE (6,657) NT466
    WRITE (6,658) NT467
    READ (5,659) NT468
    WRITE (6,659) NT468
    WRITE (6,660) NT469
    READ (5,661) NT470
    WRITE (6,661) NT470
    WRITE (6,662) NT471
    READ (5,663) NT472
    WRITE (6,663) NT472
    WRITE (6,664) NT473
    READ (5,665) NT474
    WRITE (6,665) NT474
    WRITE (6,666) NT475
    READ (5,667) NT476
    WRITE (6,667) NT476
    WRITE (6,668) NT477
    READ (5,669) NT478
    WRITE (6,669) NT478
    WRITE (6,670) NT479
    READ (5,671) NT480
    WRITE (6,671) NT480
    WRITE (6,672) NT481
    READ (5,673) NT482
    WRITE (6,673) NT482
    WRITE (6,674) NT483
    READ (5,675) NT484
    WRITE (6,675) NT484
    WRITE (6,676) NT485
    READ (5,677) NT486
    WRITE (6,677) NT486
    WRITE (6,678) NT487
    READ (5,679) NT488
    WRITE (6,679) NT488
    WRITE (6,680) NT489
    READ (5,681) NT490
    WRITE (6,681) NT490
    WRITE (6,682) NT491
    READ (5,683) NT492
    WRITE (6,683) NT492
    WRITE (6,684) NT493
    READ (5,685) NT494
    WRITE (6,685) NT494
    WRITE (6,686) NT495
    READ (5,687) NT496
    WRITE (6,687) NT496
    WRITE (6,688) NT497
    READ (5,689) NT498
    WRITE (6,689) NT498
    WRITE (6,690) NT499
    READ (5,691) NT500
    WRITE (6,691) NT500
    WRITE (6,692) NT501
    READ (5,693) NT502
    WRITE (6,693) NT502
    WRITE (6,694) NT503
    READ (5,695) NT504
    WRITE (6,695) NT504
    WRITE (6,696) NT505
    READ (5,697) NT506
    WRITE (6,697) NT506
    WRITE (6,698) NT507
    READ (5,699) NT508
    WRITE (6,699) NT508
    WRITE (6,700) NT509
    READ (5,701) NT510
    WRITE (6,701) NT510
    WRITE (6,702) NT511
    READ (5,703) NT512
    WRITE (6,703) NT512
    WRITE (6,704) NT513
    READ (5,705) NT514
    WRITE (6,705) NT514
    WRITE (6,706) NT515
    READ (5,707) NT516
    WRITE (6,707) NT516
    WRITE (6,708) NT517
    READ (5,709) NT518
    WRITE (6,709) NT518
    WRITE (6,710) NT519
    READ (5,711) NT520
    WRITE (6,711) NT520
    WRITE (6,712) NT521
    READ (5,713) NT522
    WRITE (6,713) NT522
    WRITE (6,714) NT523
    READ (5,715) NT524
    WRITE (6,715) NT524
    WRITE (6,716) NT525
    READ (5,717) NT526
    WRITE (6,717) NT526
    WRITE (6,718) NT527
    READ (5,719) NT528
    WRITE (6,719) NT528
    WRITE (6,720) NT529
    READ (5,721) NT530
    WRITE (6,721) NT530
    WRITE (6,722) NT531
    READ (5,723) NT532
    WRITE (6,723) NT532
    WRITE (6,724) NT533
    READ (5,725) NT534
    WRITE (6,725) NT534
    WRITE (6,726) NT535
    READ (5,727) NT536
    WRITE (6,727) NT536
    WRITE (6,728) NT537
    READ (5,729) NT538
    WRITE (6,729) NT538
    WRITE (6,730) NT539
    READ (5,731) NT540
    WRITE (6,731) NT540
    WRITE (6,732) NT541
    READ (5,733) NT542
    WRITE (6,733) NT542
    WRITE (6,734) NT543
    READ (5,735) NT544
    WRITE (6,735) NT544
    WRITE (6,736) NT545
    READ (5,737) NT546
    WRITE (6,737) NT546
    WRITE (6,738) NT547
    READ (5,739) NT548
    WRITE (6,739) NT548
    WRITE (6,740) NT549
    READ (5,741) NT550
    WRITE (6,741) NT550
    WRITE (6,742) NT551
    READ (5,743) NT552
    WRITE (6,743) NT552
    WRITE (6,744) NT553
    READ (5,745) NT554
    WRITE (6,745) NT554
    WRITE (6,746) NT555
    READ (5,747) NT556
    WRITE (6,747) NT556
    WRITE (6,748) NT557
    READ (5,749) NT558
    WRITE (6,749) NT558
    WRITE (6,750) NT559
    READ (5,751) NT560
    WRITE (6,751) NT560
    WRITE (6,752) NT561
    READ (5,753) NT562
    WRITE (6,753) NT562
    WRITE (6,754) NT563
    READ (5,755) NT564
    WRITE (6,755) NT564
    WRITE (6,756) NT565
    READ (5,757) NT566
    WRITE (6,757) NT566
    WRITE (6,758) NT567
    READ (5,759) NT568
    WRITE (6,759) NT568
    WRITE (6,760) NT569
    READ (5,761) NT570
    WRITE (6,761) NT570
    WRITE (6,762) NT571
    READ (5,763) NT572
    WRITE (6,763) NT572
    WRITE (6,764) NT573
    READ (5,765) NT574
    WRITE (6,765) NT574
    WRITE (6,766) NT575
    READ (5,767) NT576
    WRITE (6,767) NT576
    WRITE (6,768) NT577
    READ (5,769) NT578
    WRITE (6,769) NT578
    WRITE (6,770) NT579
    READ (5,771) NT580
    WRITE (6,771) NT580
    WRITE (6,772) NT581
    READ (5,773) NT582
    WRITE (6
```



```

121 READ (5,60) KG1
    KYG1=KG1-KSTART
    WRITE (6,67)
    READ (5,48) F1
    S2(KYG1)=F1*10ENS(KYG1)
    WRITE (6,68)
    READ (5,19) Q14
    IF (Q14.EQ.1.) GO TO 122
    WRITE (6,69)
    READ (5,19) Q15
    IF (Q15.EQ.1.) GO TO 123
    WRITE (6,66)
    READ (5,60) KG2
    KYG2=KG2-KSTART
    WRITE (6,67)
    READ (5,48) F2
    S3(KYG2)=F2*10JG(KYG2)
    WRITE (6,71)
    READ (5,19) Q16
    IF (Q16.EQ.1.) GO TO 124
    WRITE (6,71)
    READ (5,19) Q17
    IF (Q17.EQ.1.) GO TO 113
    WRITE (6,66)
    READ (5,60) KG3
    KYG3=KG3-KSTART
    WRITE (6,67)
    READ (5,48) F3
    S4(KYG3)=F3*10I(KYG3)
    WRITE (6,72)
    READ (5,19) Q19
    IF (Q19.EQ.1.) GO TO 114
    WRITE (6,73)
    READ (5,19) Q19
    IF (Q19.EQ.1.) GO TO 115
    WRITE (6,65)
    READ (5,60) KG4
    KYG4=KG4-KSTART
    WRITE (6,67)
    READ (5,48) F4
    S5(KYG4)=F4*10LDR(KYG4)
    WRITE (6,74)
    READ (5,19) Q21
    IF (Q21.EQ.1.) GO TO 116
    WRITE (6,75)
    READ (5,19) Q21
    IF (Q21.EQ.1.) GO TO 117
    WRITE (6,65)

```



```

117 117
READ (5,66) KG5
KYG5=KG5-K$TART
WRITE (6,67) F5
READ (5,48) F5
SOI(KYG5)=F5*ICDR(KYG5)
WRITE (6,76)
READ (5,19) Q22
IE (Q22.LQ.1.) GO TO 118
117 117
WRITE (6,46)
WRITE (6,47)
READ (5,48) A
WRITE (6,49) LOS
READ (5,40) LOS
WRITE (6,50) R
READ (5,46) R
WRITE (6,51) C3
READ (5,43) C3
WRITE (6,52) C4
READ (5,48) C4
WRITE (6,63) C5
READ (5,48) C5
WRITE (6,53)
READ (5,48) R1
WRITE (6,54) R2
READ (5,48) R2
WRITE (6,55) R3
READ (5,48) R3
WRITE (6,56)
READ (5,15) L7,F

```

***** LOSS COMPUTATION SECTION *****

```

00 6 K=1,3
RLOS1(K)=A
RLOS2(K)=A
RLOS3(K)=A
RLOS4(K)=A
RLOS5(K)=A
RLOS6(K)=A
RLOS7(K)=A
RLOS8(K)=A
RLOS9(K)=A
RLOS10(K)=A
RLOS11(K)=A
RLOS12(K)=A
RLOS13(K)=A
RLOS14(K)=A
RLOS15(K)=A
RLOS16(K)=A
RLOS17(K)=A
RLOS18(K)=A
RLOS19(K)=A
RLOS20(K)=A
RLOS21(K)=A
RLOS22(K)=A
RLOS23(K)=A
RLOS24(K)=A
RLOS25(K)=A
RLOS26(K)=A
RLOS27(K)=A
RLOS28(K)=A
RLOS29(K)=A
RLOS30(K)=A
RLOS31(K)=A
RLOS32(K)=A
RLOS33(K)=A
RLOS34(K)=A
RLOS35(K)=A
RLOS36(K)=A
RLOS37(K)=A
RLOS38(K)=A
RLOS39(K)=A
RLOS40(K)=A
RLOS41(K)=A
RLOS42(K)=A
RLOS43(K)=A
RLOS44(K)=A
RLOS45(K)=A
RLOS46(K)=A
RLOS47(K)=A
RLOS48(K)=A
RLOS49(K)=A
RLOS50(K)=A
RLOS51(K)=A
RLOS52(K)=A
RLOS53(K)=A
RLOS54(K)=A
RLOS55(K)=A
RLOS56(K)=A
RLOS57(K)=A
RLOS58(K)=A
RLOS59(K)=A
RLOS60(K)=A
RLOS61(K)=A
RLOS62(K)=A
RLOS63(K)=A
RLOS64(K)=A
RLOS65(K)=A
RLOS66(K)=A
RLOS67(K)=A
RLOS68(K)=A
RLOS69(K)=A
RLOS70(K)=A
RLOS71(K)=A
RLOS72(K)=A
RLOS73(K)=A
RLOS74(K)=A
RLOS75(K)=A
RLOS76(K)=A
RLOS77(K)=A
RLOS78(K)=A
RLOS79(K)=A
RLOS80(K)=A
RLOS81(K)=A
RLOS82(K)=A
RLOS83(K)=A
RLOS84(K)=A
RLOS85(K)=A
RLOS86(K)=A
RLOS87(K)=A
RLOS88(K)=A
RLOS89(K)=A
RLOS90(K)=A
RLOS91(K)=A
RLOS92(K)=A
RLOS93(K)=A
RLOS94(K)=A
RLOS95(K)=A
RLOS96(K)=A
RLOS97(K)=A
RLOS98(K)=A
RLOS99(K)=A
RLOS100(K)=A

```



```
6 CONTINUE
  RLOS1(L0S) = A+B
  RLOS2(L0S) = A+B
  RLOS3(L0S) = A+B
  RLOS6(L7) = A+B3+E
```

***** HANDWER COMPUTATION SECTION *****

```

DO I=31,KH GO TO 125
IF I.GT.31 GO TO 125
DO I2=J=1,30
  I2JG(J)=TLJG(J)+S2(J)
  TEJS(J)=TEJS(J)-S2(J)
  TLI(J)=TLI(J)+S3(J)
  TLLJG(J)=TLLJG(J)-S3(J)
  TLLOR(J)=TLLOR(J)+S4(J)
  TLI(J)=TLI(J)-S4(J)
  TLOP(J)=TLOP(J)+S5(J)
  TLODF(J)=TLODF(J)-S5(J)
  TCAPT(J)=TCAPT(J)+S6(J)
  TCOF(J)=TCOF(J)-S6(J)
CO,FINQUE
DO,FINNE
IF I.K=1,KH GO TO 1
IF I.K.GT.1,TLJG(K)+PLTJG(I-K)*TFNS(K)
  TLFNS(K)=(I-TLJG(I-K))*TFNS(K)
  TLF(I-K)=GLTFNS(K)*TLJG(K)
  TLTJG(K)=(I-TLT(I-K)+PLT(I-K))*TLJG(K)
  TLT(I-K)=GLTLT(I-K)*TLJG(K)
  TLT(I-K)=GLTLOP(I-K)*TLI(K)
  TLT(I-K)=GLTLOP(I-K)*TLI(K)
  TLOP(K)=(I-TLOP(K)+PCO(I-K))*TLOR(K)
  TLODF(K)=(I-TLODF(K)+PCDF(I-K))*TLOR(K)
  TCAPT(K)=(I-TCAPT(K)+PCAPT(I-K))*TLOR(K)
  TCOF(K)=(I-TCOF(K)+PCOF(I-K))*TLOR(K)
  TLFNS(K)=(I-TLFNS(K)+TFNS(I-K))*TLJG(K)
  TLTJG(K)=(I-TLTJG(K)+TLT(I-K))*TLOR(K)
  TLT(I-K)=GLTLT(I-K)*TLOR(K)
  TLOP(K)=(I-TLOP(K)+TLOP(I-K))*TLOR(K)
  TLODF(K)=(I-TLODF(K)+TLODF(I-K))*TLOR(K)
  TCAPT(K)=(I-TCAPT(K)+TCAPT(I-K))*TLOR(K)
  TCOF(K)=(I-TCOF(K)+TCOF(I-K))*TLOR(K)

```


FRANK WILLIAM BEESYDER, JR.

NOTES

[illegible]


```

P3(I)=0.
P4(I)=0.
P5(I)=0.
P6(I)=0.
11 CONTINUE
DO 34 J=1,15
S2(J)=0.
S3(J)=0.
S4(J)=0.
S5(J)=0.
S6(J)=0.
34 CONTINUE
WRITE (6,149) K2,PLTJG
P2(K2)=PLTJG
WRITE (6,111) K3,PLT
P3(K3)=PLT
WRITE (6,111) K4,PLCDR
P4(K4)=PLCDR
WRITE (6,112) Q3
P5(Q3)=Q3
IF (Q2.EQ.0.) GO TO 12
WRITE (6,113)
GO TO 13
WRITE (6,114) K5,PCDR
P5(K5)=PCDR
WRITE (6,115) Q3
P6(Q3)=Q3
IF (Q3.EQ.0.) GO TO 14
WRITE (6,116)
GO TO 15
WRITE (6,117) K6,PCAPT
P6(K6)=PCAPT
WRITE (6,117) Q4
P7(Q4)=Q4
IF (Q4.EQ.0.) GO TO 16
WRITE (6,117)
GO TO 17
CONTINUE
16 WRITE (6,151)
P7(K7)=P7
WRITE (6,151) Q5
P8(Q5)=Q5
IF (Q5.EQ.0.) GO TO 35
WRITE (6,151)

```



```

READ (5,142) J1
WRITE (6,152) F1
READ (5,143) F1
S2(J1)=F1*01(1,J1)
WRITE (6,152) Q6
READ (5,143) Q6
GO TO 36
35 WRITE (6,153) Q7
IF (Q7.EQ.0) GO TO 37
38 WRITE (5,142) J2
READ (5,143) F2
S3(J2)=F2*02(1,J2)
WRITE (6,154) Q9
READ (5,143) Q9
GO TO 38
37 WRITE (6,155) Q5
IF (Q5.EQ.0) GO TO 39
40 WRITE (5,143) J3
READ (5,143) F3
S4(J3)=F3*03(1,J3)
WRITE (6,156) Q10
READ (5,143) Q10
GO TO 40
39 WRITE (6,157) Q11
IF (Q11.EQ.0) GO TO 41
42 WRITE (5,142) J4
READ (5,143) F4
S5(J4)=F4*04(1,J4)
WRITE (6,157) Q12
READ (5,143) Q12
GO TO 42
41 WRITE (6,159) Q13
IF (Q13.EQ.0) GO TO 43
44 WRITE (5,143) J5
READ (5,143) F5
S6(J5)=F5*05(1,J5)

```



```

WRITE (6,16) Q14
READ (5,143) Q14 GO TO 44
IF (Q14.EQ.1.) GO TO 44
43 CONTINUE
WRITE (6,122)
WRITE (6,121) ROS
WRITE (5,102) ROS
WRITE (6,122) LUS
WRITE (5,142) LUS
WRITE (6,121) B
WRITE (5,143) B
WRITE (6,124) A
WRITE (5,143) A
WRITE (6,125) C1
WRITE (5,143) C1
WRITE (6,126) C2
WRITE (5,143) C2
WRITE (6,127) KFI
WRITE (5,142) KFI
WRITE (6,128) D1
WRITE (5,143) D1
WRITE (6,129) C3
WRITE (5,143) C3
WRITE (6,130) K2
WRITE (5,142) K2
WRITE (6,131) D2
WRITE (5,143) D2
WRITE (6,132) D3
WRITE (5,142) D3
WRITE (6,133) KF, FLAG
WRITE (5,141) KF, FLAG
WRITE (6,134) NT1
WRITE (5,142) NT1
WRITE (6,135) NT2
WRITE (5,143) NT2
WRITE (6,136) NT3
WRITE (5,142) NT3
WRITE (6,137) NT4
WRITE (5,142) NT4
WRITE (6,138) NTK
WRITE (5,142) NTK
WRITE (6,139) NT4
WRITE (5,143) NT4

```

LOSS COMPUTATION SECTION

```

DO 32 I=1,15
  RLOS1(I)=0.
  RLOS2(I)=0.
  RLOS3(I)=0.
  RLOS4(I)=0.
  RLOS5(I)=0.
  RLOS6(I)=0.
CONTINUE
DO 19 I=1,NT1
  RLOS1(I)=A
CONTINUE
DO 19 I=1,NT2
  RLOS2(I)=A
CONTINUE
DO 20 I=1,NT3
  RLOS3(I)=A
  IF (RLOS1(I).GT.3.0) GO TO 20
  IF (I.GT.LOS) RLOS3(I)=A+C1
CONTINUE
DO 21 I=1,NT4
  RLOS4(I)=A+C2
  IF (I.LT.KR1) RLOS4(I)=A+D1
CONTINUE
DO 22 I=1,NT5
  RLOS5(I)=A+C3
  IF (I.GT.KR2) RLOS5(I)=A+D2
CONTINUE
DO 23 I=1,NT5
  RLOS6(I)=A+D3+FLAG
CONTINUE
DO 31 I=1,15
  RLOS1(I)=1.
  RLOS2(I)=1.
  RLOS3(I)=1.
  RLOS4(I)=1.
  RLOS5(I)=1.
  RLOS6(I)=1.
CONTINUE

```

***** MANPOWER COMPUTATION SECTION *****

DO 23 J=1,15


```

K2(1,1)=R2(1,1)+S2(J)
R1(1,1)=R1(1,1)-S2(J)
R2(1,1)=R2(1,1)+S3(J)
R3(1,1)=R3(1,1)-S3(J)
R4(1,1)=R4(1,1)+S4(J)
R5(1,1)=R5(1,1)-S4(J)
R6(1,1)=R6(1,1)+S5(J)
R7(1,1)=R7(1,1)-S5(J)
R8(1,1)=R8(1,1)+S6(J)
R9(1,1)=R9(1,1)-S6(J)
33 DO 30 K=2,NT
    KK=K-1
    DO 1 I=2,NT1
        IF I=1-1
            R1(K,1)=R2(K,1)+P2(1)*P1(KK,1)
            R2(K,1)=(1-P2(1))*R1(KK,1)
1        CONTINUE
            R2(K,1)=P2(K,1)+P2(1)*R1(KK,1)
            DO 2 I=2,NT2
                IF I=1-1
                    R3(K,1)=R3(K,1)+P3(1)*R2(KK,1)
                    R2(K,1)=(1-P3(1))*R2(KK,1)
2                CONTINUE
                    R2(K,1)=P3(K,1)+P3(1)*R2(KK,1)
                    DO 3 I=2,NT3
                        IF I=1-1
                            R4(K,1)=P4(K,1)+P4(1)*R3(KK,1)
                            R3(K,1)=(1-P4(1))*R3(KK,1)
3                        CONTINUE
                            R4(K,1)=P4(K,1)+P4(1)*R3(KK,1)
                            DO 4 I=2,NT4
                                IF I=1-1
                                    R5(K,1)=R5(K,1)+P5(1)*R4(KK,1)
                                    R4(K,1)=(1-P5(1))*R4(KK,1)
4                                CONTINUE
                                    R5(K,1)=P5(K,1)+P5(1)*R4(KK,1)
                                    DO 5 I=2,NT5
                                        IF I=1-1
                                            R6(K,1)=R6(K,1)+P6(1)*R5(KK,1)
                                            R5(K,1)=(1-P6(1))*R5(KK,1)
5                                        CONTINUE
                                            R6(K,1)=P6(K,1)+P6(1)*R5(KK,1)
                                            DO 6 I=2,NT6
                                                IF I=1-1
                                                    R7(K,1)=R7(K,1)+P7(1)*R6(KK,1)
                                                    R6(K,1)=(1-P7(1))*R6(KK,1)
6                                                CONTINUE
                                                    R7(K,1)=P7(K,1)+P7(1)*R6(KK,1)
                                                    DO 7 I=2,NT7
                                                        IF I=1-1
                                                            R8(K,1)=R8(K,1)+P8(1)*R7(KK,1)
                                                            R7(K,1)=(1-P8(1))*R7(KK,1)
7                                                        CONTINUE
                                                            R8(K,1)=P8(K,1)+P8(1)*R7(KK,1)

```



```

R1(K,I)=(1-PLDS1(I))* R1(K,I)
7  CONTINUE
DO 26 I=1,NT2
R2(K,I)=(1-PLDS2(I))* R2(K,I)
26 CONTINUE
DO 27 I=1,NT3
R3(K,I)=(1-PLDS3(I))*P3(K,I)
27 CONTINUE
DO 28 I=1,NT4
R4(K,I)=(1-PLDS4(I))* P4(K,I)
28 CONTINUE
DO 29 I=1,NT5
R5(K,I)=(1-PLDS5(I))* R5(K,I)
29 CONTINUE
DO 30 I=1,NT6
R6(K,I)=(1-PLDS 6(I))* R6(K,I)
30 CONTINUE

```

***** ** ** ** ** OUTPUT SECTION ** ** **

```

WRITE (6,103) NP
103
TR1(NT)=0.
TR2(NT)=0.
TR3(NT)=0.
TR4(NT)=0.
TR5(NT)=0.
TR6(NT)=0.
DO 25 I=1,15
TR1(NT)=TR1(NT)+R1(NT,I)
TR2(NT)=TR2(NT)+R2(NT,I)
TR3(NT)=TR3(NT)+R3(NT,I)
TR4(NT)=TR4(NT)+R4(NT,I)
TR5(NT)=TR5(NT)+R5(NT,I)
TR6(NT)=TR6(NT)+R6(NT,I)
25 CONTINUE
WRITE (6,14) (K1(NT,I), I=1,15), (R1(NT),
WRITE (6,14) (K2(NT,I), I=1,15), (R2(NT),
WRITE (6,14) (K3(NT,I), I=1,15), (R3(NT),
WRITE (6,14) (K4(NT,I), I=1,15), (R4(NT),
WRITE (6,14) (K5(NT,I), I=1,15), (R5(NT),
WRITE (6,14) (K6(NT,I), I=1,15), (R6(NT),
STOP
END

```


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ABSTRACT

This thesis develops two personnel flow models which can aid the manpower policy planner to predict future officer structures through the use of a time-shared computer system. The underlying structure is presented for both models. One model considers promotions based on length of commissioned service. The other model considers promotions based on length of time in grade. Computer programs are developed for both models and sample outputs are shown. The programs are used on a time-shared computer system so that the policy planner can interact with the computer with a minimal knowledge of computer programming. The computer output is in a concise, easy to understand form.

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